27

POSTPRODUCTION SUPPORT (PPS)

Acquisition Strategy: "Each PM shall develop and document an Acquisition Strategy that shall serve as the roadmap for program execution from program initiation through Postproduction Support."

Industrial Capability: "Prior to production termination, Components shall take actions to ensure there will be adequate industrial capabilities and capacity to meet postproduction operational needs."

DoD 5000.2-R

27.1 DISCUSSION

The terms just-in-time logistics and focused logistics, in concert with Flexible Sustainment (FS), describe the logistics support system (including postproduction support), which DoD is striving to attain by the year 2000. Focused logistics will be the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while en route, and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical level of operations. Just-in-time logistics connotes a sharp reduction in the warehousing of spare parts, combined with compensating responsiveness in the fabrication and transportation elements of the logistics system. The common thread among these three initiatives (just-in-time logistics, focused logistics, and FS) is the managerial challenge of maintaining readiness at a substantially lower cost than in the past, i.e., developing a better, more cost-effective way to provide logistics support.

The actual attainment of focused logistics, as well as many of the initiatives comprising just-in-time logistics, lays outside the purview of the individual acquisition program. However, the resulting macro logistics system will have a significant impact on the accomplishment of postproduction support.

27.2 BACKGROUND AND OBJECTIVE

The objective of operational and postproduction support planning is to maintain the system in a ready condition throughout its operational phase within Operations & Support (O&S) cost levels documented in Life-cycle Cost (LCC) estimates and acquisition program baselines. Accordingly, the developer/Program Manager (PM) of Major Defense Acquisition Programs (MDAPs) and Major Automated Information Systems (MAISs) are directed by DoD 5000.2-R (which serves as a general model for other programs) to plan for postproduction support as part of the overall program acquisition strategy.

Postproduction support planning is a relatively new responsibility for PMs. Prior to early 1991, operational and postproduction support planning was often left to the readiness or commodity commands of each Service. Developers were most concerned with design, development, production, and deployment of new systems. However, senior operational commanders took issue with this process because of the support problems encountered in maintaining systems in mission-ready condition. Moreover, readiness/commodity commands discovered continuing problems in providing spares, repair parts, and technical data because data packages were often unsuitable for competitive procurement; sole-source vendors had gone out of business; or the long-lead time for production would not meet urgency requirements. Hence, the Services and DoD realized that the development process must embrace a true "cradle-to-grave" design approach.

Today, the PM is charged with the responsibility for postproduction planning. Some would argue that the PM has enough to do without the added burden of this effort. However, if we consider the U.S. marketplace as product consumers, what are our expectations of manufacturers in the way of postproduction support of appliances, video recorders, or even our automobile? When contemplating the purchase of desktop or laptop personal computers, are we concerned about warranty, technical support, or the addition or replacement of components? What about response time? These are indeed important issues to consider. A company that failed to meet our expectations would probably not do well in the marketplace, and it is no accident that manufacturers give significant consideration to such design requirements. The military user must also have a comparably high level of support and responsiveness to meet their readiness requirements and mission objectives.

27.3 METHODS

Planning for postproduction support begins in the Concept Exploration phase, with much of the detailed planning and execution starting in the Engineering and Manufacturing Development (EMD) phase, when components and manufacturers of components are selected. (See Figure 27-1.) Design can still be influenced to lessen or eliminate any potential postproduction support problems. Development will take place using performance specifications in lieu of the detailed specifications used in the past. Interface specifications will be designed to promote open system architecture, permitting flexibility in accomplishing future updates and technology insertion. This early planning and analysis is at the heart of reliability based logistics. The analysis effort should be performed by or under the direction of an appropriate Integrated Product Team (IPT), and the government members should perform any segments that are beyond the scope of the EMD/Production contracts. The impacts of the emerging focused logistics system and reliability based logistics efforts must be integrated into the support analysis, with the expectation that spares requirements will be favorably affected. Likewise, items that are single-source or those that the government cannot obtain data rights for, should be identified; and plans should be laid for appropriate long-term support, e.g., organic support capability, production-line buy-out, or contractor logistics support agreements.

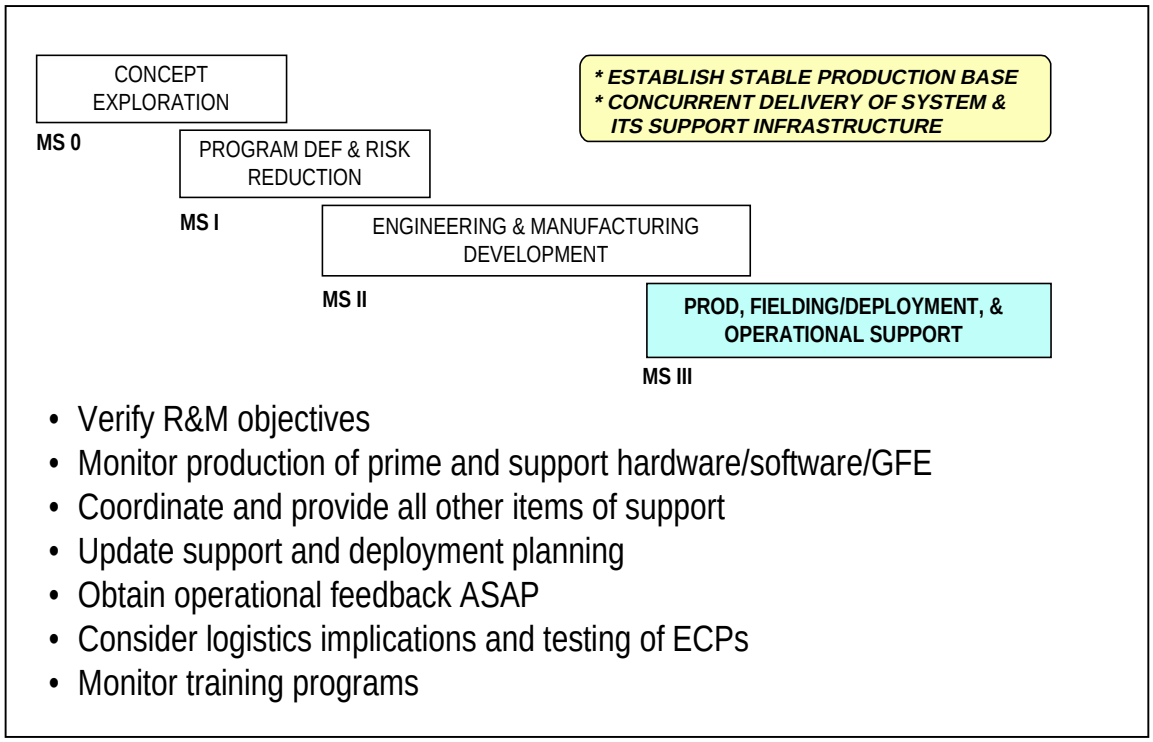

Figure 27-1: Time-Phased Support Activities

Despite the best planning efforts, support problems are certain to occur during the post-production period. The digital data stored in the Continuous Acquisition and Life-Cycle Support (CALS) system as well as other DoD Component-specific data systems will be important resources in analyzing support problems and developing appropriate corrective actions. Identified support problems, such as inadequate sources of supply or repair, should be analyzed to determine alternative solutions, the costs and associated risks involved, and an estimate of the funding and other actions required to implement preferred solutions.

Service lives of current systems have been extended for periods far beyond those originally planned. As a consequence, many suppliers are no longer in business or are unwilling to accept contracts for components that they originally produced in the distant past. Therefore, new sources will necessarily have to be brought on line through flexible manufacturing or other means. Some of the components thus affected can be replaced through the use of performance specifications, but others will likely require some detailed specifications to properly function in major systems designed in the earlier era of detailed specifications.

Opportunities to lower system life- cycle cost through technology insertion should be sought. In general, succeeding generations of technology offer both improved performance and improved supportability. Once identified, a potential candidate for technology insertion should be recommended through appropriate channels for inclusion in the Reliability, Maintainability, and Supportability (RM&S) depot maintenance modification program.

27.4 TIMING AND ISSUES

Given the need to consider postproduction support issues, how and when does the PM accomplish postproduction support planning? First you need to understand typical issues, such as:

- increased parts usage,
- inadequate technical data,
- technological obsolescence,
- unacceptable LCC,
- lost vendor capability to provide spares/repair parts, and
- item deleted with no substitute.

Using a ten-year-old automobile as an example, what do you expect in the way of effective support regarding the examples above? Is it cost effective for manufacturers to make parts for a declining number of their products still in use? At what point should they halt production of spares? Will there be sufficient demand for manufactured parts? Are their original vendors still in business; and, if so, what was done with the tooling last used years ago?

Accordingly, if the need to conduct postproduction planning is accepted, how and when is it done? Planning is normally a government/contractor effort with a contractual requirement for the contractor to develop the postproduction support plan, which is subject to government coordination and approval. Such a plan normally is completed by Milestone III and updated periodically thereafter. The contractor does this effort as part of an overall supportability analysis structured to meet the PM's acquisition strategy of "cradle-to-grave" LCC and planning. Figure 27-2 provides a generic Postproduction Support (PPS) decision process.

27.5 DATA COLLECTION

Once a PPS plan has been created, it is important to have some way of measuring system readiness, which could trigger planned actions to provide effective support to the user. During O&S activities, the user implements a Unit Readiness Reporting system, which rates his organizational ability to meet assigned mission requirements. One part of this

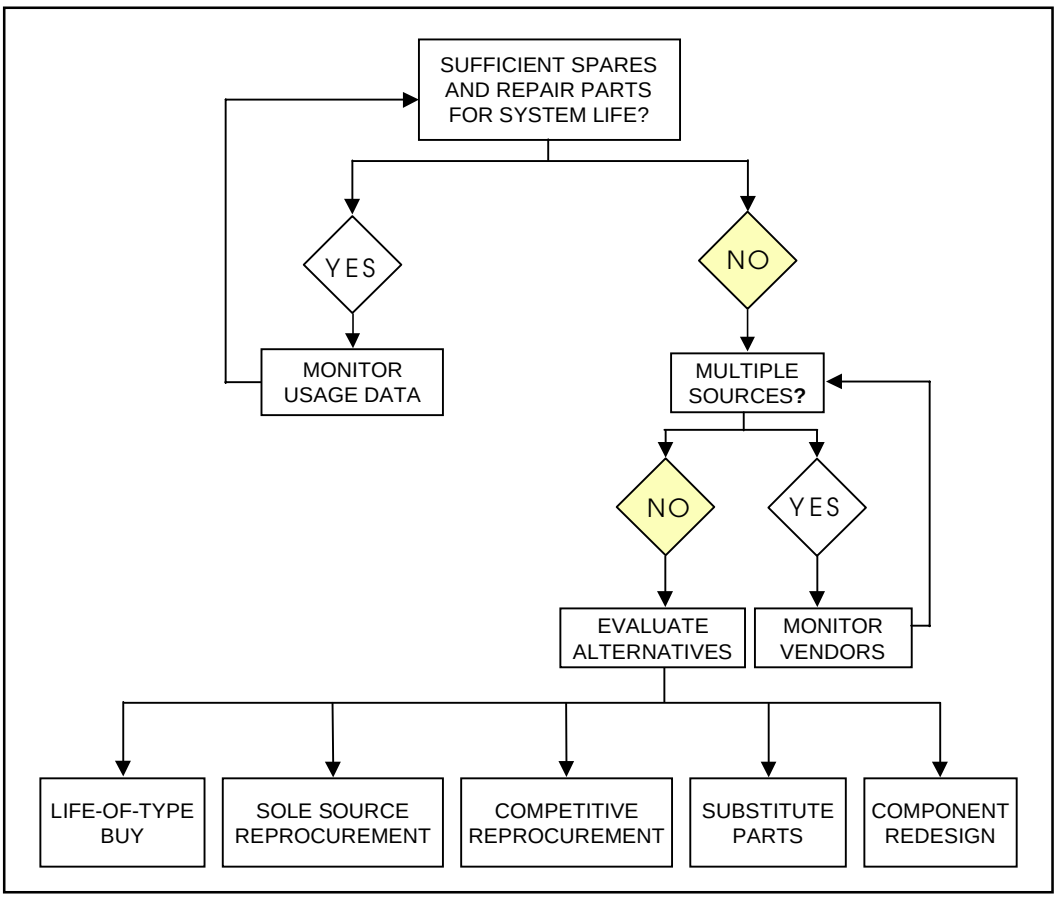

Figure 27-2: Postproduction Support Decision Process

report comments on materiel/system availability and offers reasons for non-mission ready systems. Another source of measuring system performance during the O&S phase is service maintenance data collection systems including:

- Army – the Army Maintenance Management System (TAMMS)
- Navy – maintenance and Materiel Management (3M)
- Air Force – Core Automated Maintenance System – Reliability Maintenance Information System (CAMS - REMISS)
- All Services – on-site contractor technical representatives.

This information and other sources will help us determine the specific cause of performance degradation. Examples are poor component reliability; aging systems; or, perhaps, improper fault identification. Current best practices include efforts identified as spares modernization, lean logistics, flexible sustainment, and other traditional sustainment remedies.

27.6 EXAMPLE

The Navy F-14A/B weapons system program provides an example of technology insertion as a part of postproduction support. The program office initiated a project to replace older mechanical gyroscopes with modern electronic ring-laser gyroscopes in each aircraft. The mechanical gyroscopes demonstrated an MTBF of 40 hours; and the ring-laser gyros demonstrated an MTBF of 4,500 hours, which was more than a 100-fold increase. A conservative analysis (which did not capture all of the cost benefits of the replacement) showed that the break-even point, i.e., when the savings repaid for the initial investment, occurred in the fifth year of operation. Substantial life-cycle support cost savings will accrue in the following years of service life planned for the F-14A/B weapons system. Of course, system readiness has improved from the very onset of the replacement program.

27.7 POSTPRODUCTION SUPPORT PLANNING

As previously noted, a postproduction support plan is normally undertaken as a joint government-contractor effort performed during EMD. It should be completed prior to Milestone III by an IPT and coordinated with other appropriate documents and the actions of other IPTs. The postproduction support plan should be maintained as long as the system is in the active inventory and should focus on issues such as:

- system and subsystem readiness objectives in the postproduction time frame
- organizational structures and responsibilities in the postproduction time frame
- modifications of planning documents to accommodate the needs of PPS planning
- resources and management actions required to meet PPS objectives
- assessment of the impact of technological change and obsolescence
- evaluation of alternative PPS strategies to accommodate production phase-out (second sourcing, standardization with existing hardware, engineering level of effort contracts in the postproduction time frame, life-of-type buys, contract logistics support versus organic support, maintenance concept change, suitable substitute, redesign, flexible computer integrated manufacturing)
- consideration of support if the life of the system is extended past the original forecast date
- data collection efforts in the early deployment phase to provide the feedback necessary to update logistics and support concepts
- potential for foreign military sales and its impact on the production run

- provisions for the use, disposition and storage of Government tools and contractor-developed factory test equipment, tools, and dies

Table 27A, at the end of this chapter lists additional issues that should be addressed in post-production support planning.

27.8 ESTABLISHING A COMPETITIVE ENVIRONMENT

Relying on a single industrial source for critical support may increase risk in the cost and availability of spares and repair parts during the operational phase and, particularly, after termination of end-item production. The Logistics Manager (LM) should consider obtaining technical data, drawings, tooling, etc., to enable the Service to compete follow-on logistics support. The cost of obtaining this capability should be weighed against the potential benefits of competition, particularly during an extended postproduction period. Detailed component breakout plans, initially stated in the acquisition strategy and subsequently updated and refined, should be consulted. (Note: Historically, the government has not done a good job keeping configuration under control after the loss of production experience, equipment, and drawings; and it has purchased inadequate technical documentation to enable the breakout and competition of equipment, spares and, repair parts. Good documentation and configuration control is essential if the government is to successfully compete for follow-on support. It may be advisable to have the major manufacturer continue a level of effort in documentation after the production line closes).

27.9 POSTPRODUCTION SUPPORT DECISION MEETING

The PM should conduct a PPS decision meeting prior to the final production order to avoid major nonrecurring charges (if follow-on production is later required) and to update the PPSP based upon the latest data available. The meeting should also explore the advisability of purchasing items from the manufacturer; these items might include manufacturing structures, forgings and castings, insurance items to cover crash/battle damage or fatigue, proprietary data, and raw material.

27.9.1 Other Remedies

When faced with the imminent loss of production sources for unique spares and repair parts, there are two basic options available to LMs: they are to increase the supply or decrease the demand. A combination of actions listed in Figure 27-3 is often the most practical approach. These remedies are generally less effective and more costly than effective actions taken earlier in the production cycle.

27.10 FUNDING OF ENGINEERING AND PUBLICATIONS SUPPORT

There is generally a continuing need to correct hardware design, specifications, and software after the completion of system development. Changes to technical manuals are also

SPARE AND REPAIR PARTS ACTIONS	
INCREASE SUPPLY	**DECREASE DEMAND**
• Develop a reprocurement technical data package and alternate production sources. • Withdraw from disposal source. • Procure life-of-type buy. • Seek substitute (interchangeable) parts. • Redesign system to accept standard components if not interchangeable. • Purchase plant equipment; establish an organic depot capability. • Subsidize continuing manufacturing. • Draw (cannibalize) from marginal, low priority systems.	• Restrict the issue to critical applications in support of combat essential items. • Phase out less essential systems employing the same parts. • Restrict issue to system applications where no substitute is available. • Accelerate replacement of the system.

Figure 27-3: Logistics Actions to Reduce Impact of Loss of Production Sources

needed to reflect the system and software changes and to correct other deficiencies reported by operator and maintenance personnel. While the materiel system (end item) is still in production, the procurement appropriation bears the major burden of these costs. However, an abrupt change in funding responsibility occurs at the beginning of the first

Figure 27-4 is a notional display of the continued funding requirement for these costs extending into the O&S phase. While the total requirement for engineering and publication support should decrease as initial problems are detected and corrected, the total burden for such costs shifts to the Operation and Maintenance (O&M) appropriation after the termination of system production. Early recognition of the need for postproduction support and the programming and budgeting of O&M funds are required to maintain a continuity of effort. The increase in fund requirements shown in the late postproduction phase is attributed to growing design obsolescence and wearout. The LM should work directly with his supporting O&M appropriation manager to develop valid requirements estimates, which are usually derived from experience with similar systems, and the LM should program and budget accordingly.

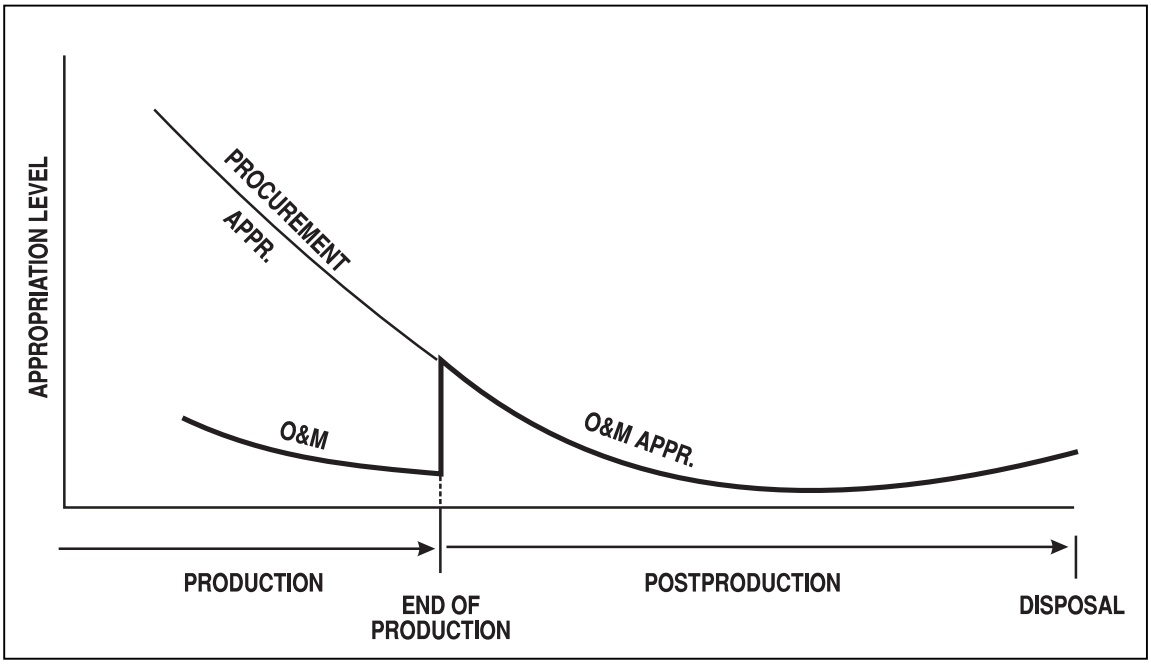

Figure 27-4: Sources of Engineering and Publication Funding

27.11 TIMELY PPS PLANNING

Postproduction support planning must be performed when acquisition strategy, design, and documentation options are still available for incorporation into an effective PPSP. To delay the planning invites the risk of having inadequate engineering and financial support for sustained system readiness and availability. The PPSP must be maintained and tied to each update of logistics plans. While such plans are essential to establishing the supportability and readiness of the materiel system, the PPSP is crucial to maintaining that supportability and readiness throughout the system's life.

27.12 SUMMARY

- The first empirical measure of system readiness occurs when the system is deployed in the operational phase.
- Readiness and R&M experience during the operational phase is employed to adjust the support resources that were programmed during the EMD and Production, Fielding/Deployment, and Operational Support phases.
- Performance and R&M deficiencies must be detected and corrected as early as possible in the O&S phase of the system.
- The objective of planning performed during system development is to ensure that readiness objectives are met and sustained through the O&S phase, including the postproduction period. Planning deferred until the problems are encountered will have limited effectiveness.

TABLE 27A
POSTPRODUCTION SUPPORT CHECKLIST

1. Supply Support

a. Continued producibility and availability of components and parts. (Peculiar items within the system should be reviewed down to the subcomponent level and national stock number.)

(1) Is technical data available at a reasonable cost?
(2) Is stability of design a concern?
(3) Is competitive procurement appropriate?
(4) Is the production base adequate?
(5) What proprietary rights, if any, have been declared by the prime or subcontractors?
(6) Are rights in data procurable at a reasonable cost?
(7) What is life-of-type buy potential?
(8) Are repair facilities available?
(9) Is the component critical to system performance?
(10) What is the expected life of the system/subsystem?
(11) Is there FMS support potential?
(12) Are workaround alternatives available?
(13) Are quality assurance requirements unique, difficult to duplicate?
(14) Is contract logistics support feasible?
(15) Will failure rates be high enough to sustain organic capability?
(16) Technology obsolescence. Is the system or part replaceable with new technology?
(17) Will potential design changes eliminate the need for the part?
(18) Is an engineering level-of-effort contract appropriate to ensure continued supportability?

b. What support equipment is required?

c. Will support of support equipment be available at a reasonable cost?

d. Is there an adequate organization to focus on and resolve postproduction problems?

TABLE 27A (Cont'd)
POSTPRODUCTION SUPPORT CHECKLIST

2. Engineering

a. Who has been designated to perform acceptance inspection QA on tech data?

b. Will there be adequate field engineering support, configuration management, and ECP support? Will there be adequate support to update:

(1) Technical manuals
(2) Production drawings
(3) Technical reports
(4) Logistics support data
(5) Operational and maintenance data
(6) User's manuals
(7) Data requirements

c. Will operational experience be considered in changes to the materiel system?

3. Competitive Procurement

a. Is production rate tooling complex/cost significant; is it readily available to procure, or a long lead item?

b. Are all cost factors associated with a breakout/competitive procurement decision considered? Cost elements should encompass added tooling, special test equipment, qualification testing, quality control considerations, rights in data procurement, etc. If performance specifications are applicable, the following additional costs pertain: cataloging, bin opening, item management, technical data, production and distribution variables, configuration control and engineering requirement costs, etc.

c. Are all potential customers included in the production requirements computations?

4. ATE Support

a. Hardware

(1) Will hardware be supportable?
(2) Will mission, ECP changes be compatible?
(3) Will modifications be possible, supportable?
(4) Is system expandable?

TABLE 2A (Cont'd)
POSTPRODUCTION SUPPORT CHECKLIST

b. Software

(1) Will diagnostic software changes be possible?
(2) Will the organizational structure allow for continuing software update?
(3) Will software changes caused by ECP/mission changes be incorporated?

5. Storage and Handling

a. Will shelf-life items be replaceable when they expire?

b. Will special shipping containers be replaceable/repairable?

c. Will peculiar manufacturing tools and dies be procured and stored?

6. Technical Data

a. Will manufacturing shop standards and procedures be retained?

b. Will all changes that occur during the production phase be incorporated in the manufacturing shop drawings?

7. Training

a. Will simulators and maintenance trainers be supportable in the out years?

b. Will follow-on factory training be required?

8. Maintenance

a. Will depot overhaul be required in the out-years? Organic — Contract.

b. Will provisions be made in the front end to accommodate a service life extension program if required? (Most recent materiel systems have been extended well past their original forecasted disposal date).

c. Will components be available to support the depot overhaul program in the out-years?

d. Is it realistic to co-mingle manufacturing with repair on a single production line?